

## The status, ecology and conservation of *Lycaena dispar* (Lycaenidae: Lycaenini) in Europe

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**Summary.** Past and present distribution maps are presented for the endangered butterfly, *Lycaena dispar* ([Haworth], 1802), in Europe. Recent changes in distribution show that the species is under greatest threat in the north of its range, particularly univoltine populations. Declines have not occurred everywhere but the species is vulnerable to rapid decline if its wetland habitats are developed for agricultural use. Priority actions are suggested for its conservation.

**Zusammenfassung.** Das ehemalige und aktuelle Vorkommen der bedrohten Tagfalterart *Lycaena dispar* ([Haworth], 1802) in Europa wird auf Verbreitungskarten dokumentiert. Rezente Veränderungen des Vorkommens zeigen, daß die Art am stärksten im Norden ihres Areals bedroht ist, besonders im Falle univoltiner Populationen. Die Art ist nicht überall im Rückgang begriffen, aber sie ist immer dort aktuell im Bestand bedroht,

wo Feuchthabitate zu landwirtschaftlichen Nutzflächen umgewandelt werden. Prioritäten für Schutzmaßnahmen zur Erhaltung der Art werden vorgeschlagen.

**Résumé.** Présentation de cartes européennes de répartition, passées et actuelles, du papillon diurne menacé *Lycaena dispar* ([Haworth], 1802). De récents changements dans la répartition montrent que cette espèce est gravement menacée dans le nord de son aire, spécialement les populations univoltines. Les déclinés ne sont pas survenus partout mais l'espèce est sensible à une réduction des habitats humides exploités par l'agriculture. Des actions prioritaires sont suggérées pour sa conservation.

**Key words:** Lycaenidae, *Lycaena dispar*, distribution, status, ecology, conservation, Europe.

## Introduction

The butterfly *Lycaena dispar* ([Haworth], 1802) has been recognised as one of the most endangered insects in Europe. The rapid decline of its wetland habitat in north-west Europe has drawn attention to its vulnerability and resulted in its inclusion in the Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979) and in Annexes II and IV of the EC Habitats Directive (1992) as a species requiring strict protection in its own right and designation of special areas of conservation. It is also currently listed as endangered in the IUCN (world) Red Data Book (IUCN 1990).

The aims of this paper are to present information on the current distribution of this species in Europe, on the variation in its ecology and habitat requirements across its range, and to suggest priority actions for its conservation.

## European distribution

The current distribution is shown in figure 1 and is based on records gathered within each country, either by the authors or from recently published distribution maps (Bink, 1995; Kudrna, 1994; Reichl, 1992; Reinhardt & Thust, 1993; Ebert & Rennwald, 1991; Engel, 1987; Jaksić, 1988). For comparison, its probable distribution before large-scale drainage (from known records) is shown in figure 2. This is based on all available records including Bretherton (1966) and Bink (1995). There is also a recent report by Altmüller *et al.* (1991) that the species occurs in the Lower Saxony area of Germany, but the locations are not shown on the map to protect the few remaining sites.

## Ecology and habitat requirements

As with many widespread insect species, the ecology and habitat requirements of *L. dispar* vary across its range. In the Netherlands and the introduced sites in the UK it is univoltine with no records of second generations. In northern Poland populations are also univoltine, but are capable of producing a partial second generation in warm years, such as 1995. At mid latitudes, from France through southern Belgium, Germany, Austria, Czech Republic, Slovakia, Hungary and Romania, populations are bivoltine. In more southerly locations, three generations may be possible in some years depending on elevation.

In the Netherlands and introduced UK populations, larvae feed exclusively on *Rumex hydrolapathum*. This is also the preferred host plant in Poland, suggesting a link between univoltinism and dependence on this food plant. In mid latitudes from France across to Romania, up to five species are used, *R. hydrolapathum*, *R. acetosa*, *R. aquaticus*, *R. crispus* and *R. obtusifolius*, with the latter two being preferred in some places. A few records also exist for *Polygonum bistorta* as a food plant, but this is regarded as erroneous by Ebert & Rennwald (1991).

The species is closely associated with wetland habitats across its entire range, but its requirements appear to become more specialised towards the north of its range. In the Netherlands the species is confined to fenland habitats which have been created and maintained by traditional farming. These areas are under a variety of management regimes including winter cutting for reed, *Phragmites australis*, summer mowing for hay and summer grazing. The males form territories in July within the summer mown areas (hay meadows) before they are cut (Pullin & Webb, submitted). This situation appears to be similar in Poland, where males are most frequently seen in moist meadows. In central Europe, where there are two generations, the habitat requirements for the first generation are similar to the univoltine races, except rather less specialised, exploiting acid meadows and pastures, reflecting the use of a greater range of food plants. The second generation appears to behave differently from the first, dispersing through a wider range of habitats, including drier areas. In Belgium both generations have been recorded breeding in fallow land in industrial areas and on railway verges.

All populations appear to overwinter in either the second or third larval instar. Diapausing larvae also appear to be resistant to the frequent flooding which is typical of their habitat in fens and river valleys. However, there is some evidence that periods of flooding longer than 1 month may cause significant mortality (Webb, 1995). Flooding whilst the larvae are actively feeding seems to cause catastrophic mortality (Duffey, 1977), and this may limit the length of the season in some areas, particularly in the spring.

### Conservation

The distribution maps show that the decline in range of this species is most serious in north-west Europe, particularly the univoltine populations in the UK and The Netherlands, and bivoltines in northern Germany, but local declines are also notable in other areas, such as Italy. However, in some areas

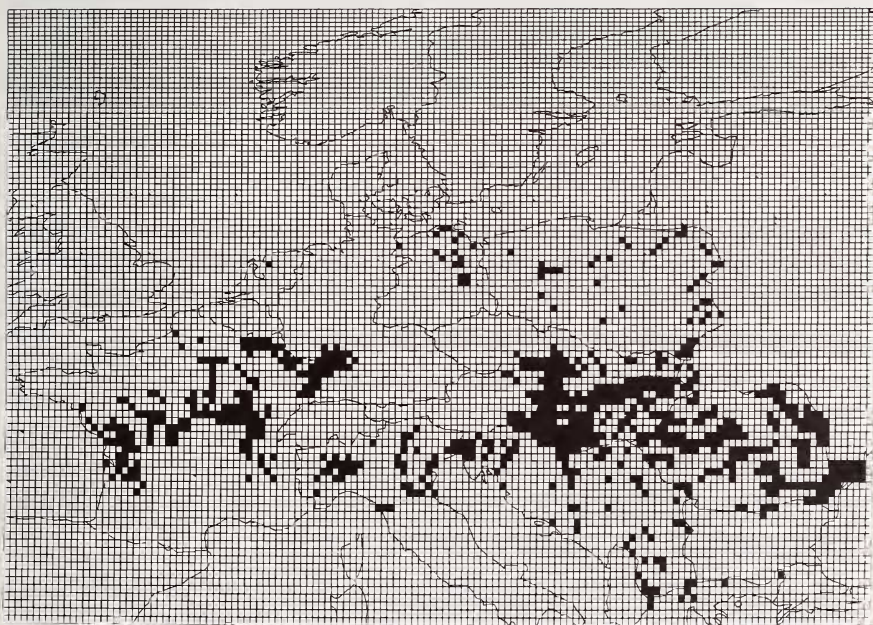


Figure 1. Present European distribution of *Lycaena dispar* ([Haworth], 1802), based on distribution maps and site records from the last 10 years. Distributions are based on a 15' square grid.

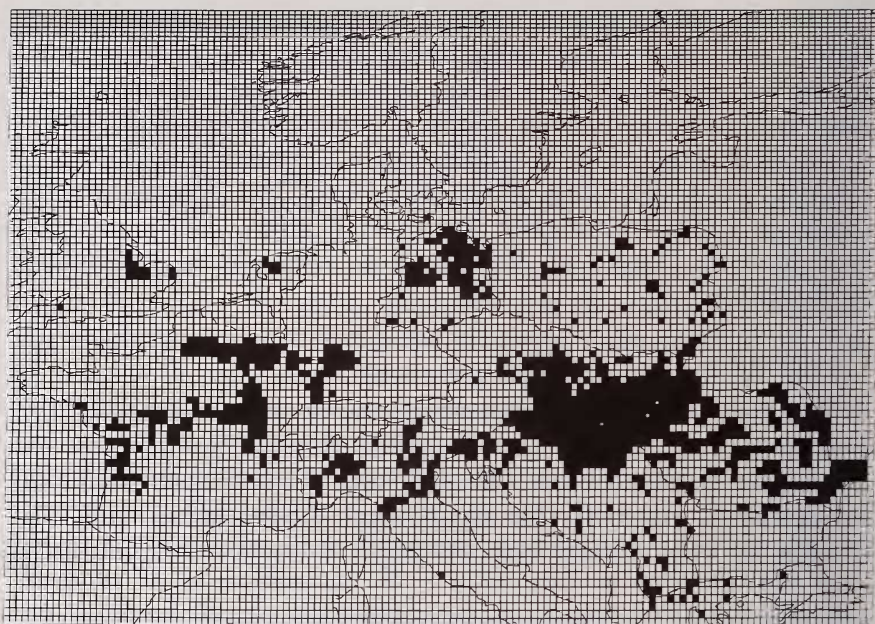


Figure 2. Past European distribution of *Lycaena dispar* ([Haworth], 1802), based on distribution maps and records up to the last 10 years. Distributions are based on a 15' square grid.

of central Europe and in France there is no evidence of decline. Interestingly, in Belgium, the species seems to have declined from wetter habitats where *R. hydrolapathum* is used as a foodplant, but has increased in abundance in drier habitats where it uses *R. crispus* and *R. obtusifolius*. Further research is required to monitor this situation.

Action plans for the species recovery in the UK and The Netherlands have already been produced (Butterfly Conservation, 1995; Oostermeijer, 1996). Conservation of this species should concentrate on the following priority actions:

1. Study of the habitat requirements of the species in the most vulnerable areas (particularly the univoltine populations) where it still exists in order to halt further declines.

2. Restoration in areas where it has previously disappeared in order to reverse the decline. This should only be done if the

reasons for the original extinction have been removed and sufficient habitat exists to maintain viable populations or metapopulations.

3. Regular monitoring of its distribution in the strongholds of its range in eastern Europe, south-west Germany and France.

A major problem with meeting the first two objectives is the integration of management plans for the habitat with the ecology of the species. *L. dispar* appears to have an opportunistic strategy exploiting early stages in hydrosere succession. Future work needs to concentrate on appropriate management of habitat at local and regional scales.

### Acknowledgements

Many people provided information to the authors, including P.M. Kristal/ARGEHELEP-working group on Lepidoptera of Hessen (Germany) and the Working Group on Lepidoptera in Wallonia (Belgium). The authors acknowledge support through English Nature's Species Recovery Programme to ASP.

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